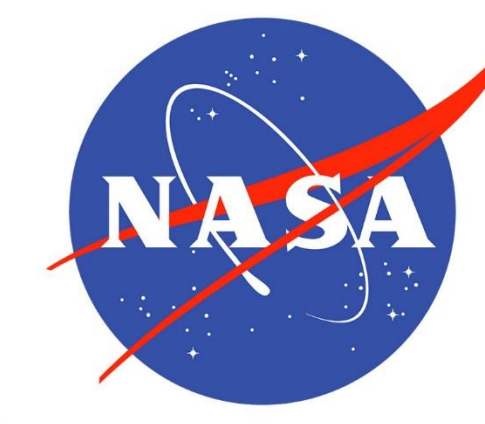




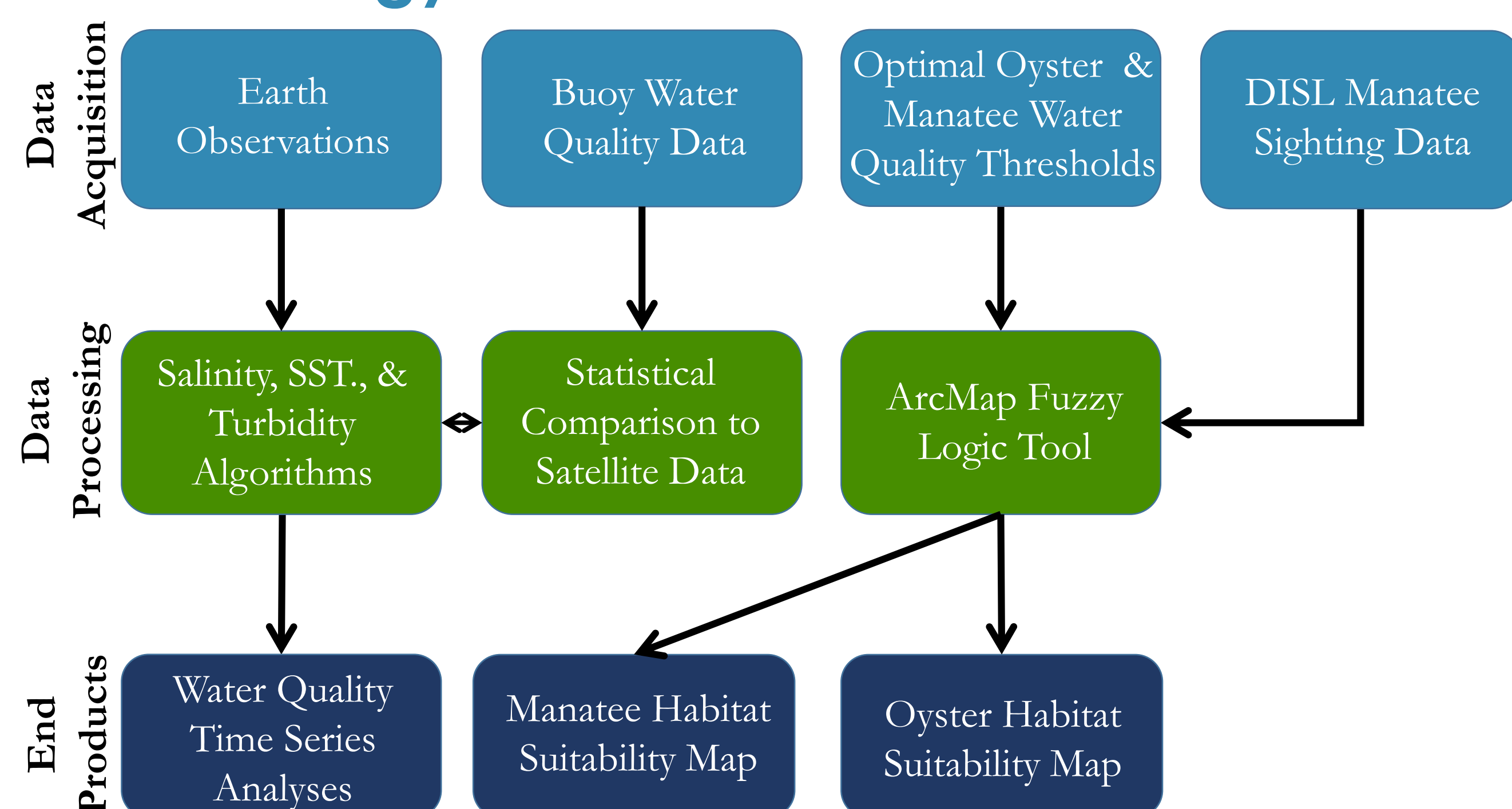
# Using NASA Earth Observations to Evaluate Water Quality in Coastal Alabama to Enhance Marine Wildlife Management



## Abstract

The Mobile Bay and Mississippi Sound are the main coastal estuaries along the Alabama and Mississippi Gulf Coast. They serve as the primary drainage outlets for the Mobile Bay and Pascagoula River watersheds and provide a gradient of coastal water salinity conditions needed for a diversity of wildlife species and coastal habitat types. Coastal water “health” conditions have a direct impact on the native biota that are sensitive to water quality, including the Eastern oyster (*Crassostrea virginica*), a keystone species, and the West Indian manatee (*Trichechus manatus*), a vulnerable species. This project addressed the dynamic coastal ecosystem by creating time series analyses to monitor salinity, temperature, and turbidity changes for the Mobile Bay and Mississippi Sound from June 2007 to May 2017. The Aqua Moderate Resolution Imaging Spectroradiometer (MODIS) was used to detect salinity and sea surface temperature, while Landsat 5, Landsat 8, and Sentinel-2 Multispectral Instrument (MSI) were employed to detect turbidity levels and validate sea surface temperature. These data products were used to compute habitat suitability maps for oysters and manatees in the Mobile Bay and Mississippi Sound to assess the optimal areas and conditions for habitat restoration initiatives. Project partners will use product results to better understand manatee movements and habitat suitability for oysters.

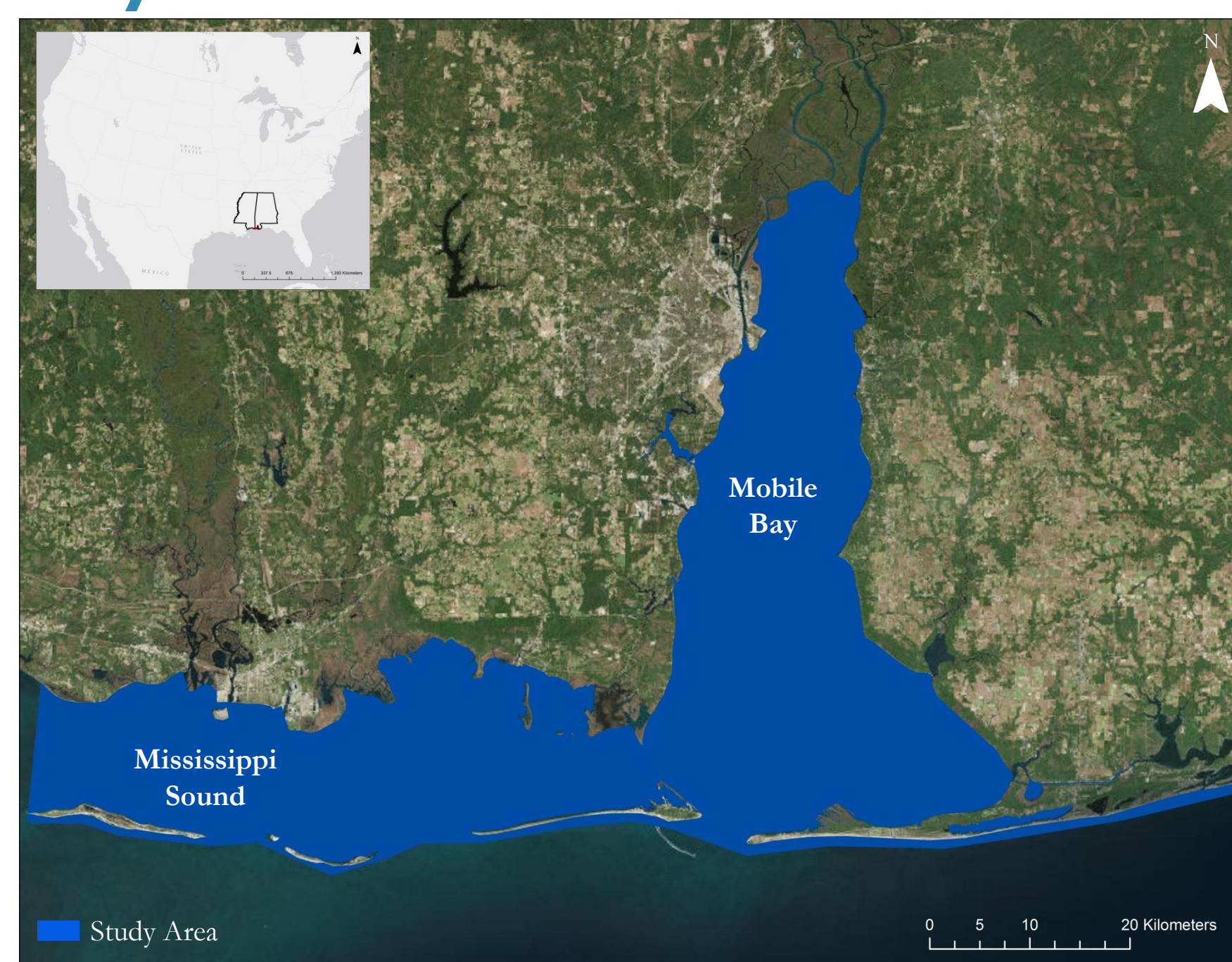
## Methodology



## Objectives

- **Conduct** salinity, sea surface temperature (SST), and turbidity analyses using Aqua MODIS, Landsat 5 TM, Landsat 8 OLI and TIRS, and Sentinel-2 MSI satellite imagery in conjunction with *in situ* data
- **Produce** time series analyses that assess salinity, temperature, and turbidity changes occurring from 2007 to 2017
- **Compute** West Indian manatee and Eastern Oyster habitat suitability maps

## Study Area



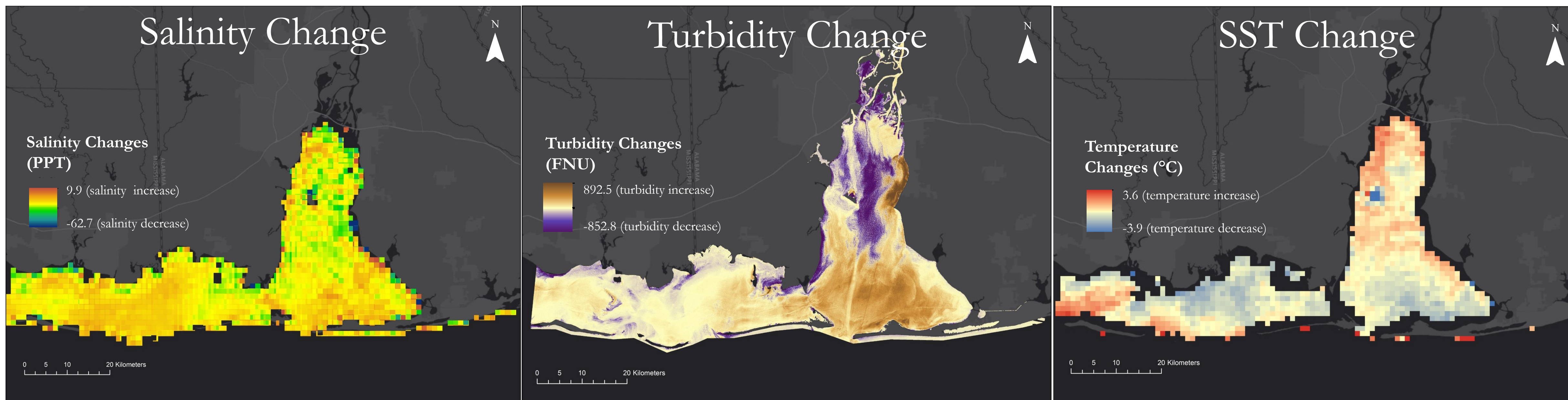
## Earth Observations



## Results

### Maps of Water Quality Change from 2007 to 2017

Data averaged from 6/1/07 – 5/31/08 were subtracted from data averaged from 6/1/16–5/31/17 to visualize temporal differences in each water quality parameter.



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## Project Partners

- Alabama Coastal Foundation
- Dauphin Island Sea Lab
- The Nature Conservancy

## Acknowledgements

- Dr. Maury Estes, Universities Space Research Association
- Dr. Robert Griffin, University of Alabama in Huntsville
- Dr. Jeffrey Luvall, NASA at Marshall Space Flight Center
- Dr. Kenton Ross, NASA Langley Research Center
- Leigh Sinclair, University of Alabama in Huntsville, Information Technology and Systems Center
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## Conclusions

- NASA EO data were used to view coastal water salinity change in the study area from 2007 to 2017 with **salinity increasing** in north and southeastern Mobile and in central Mississippi Sound.
- Increases in estuarine salinity can **affect oyster reefs** because of the **oyster drill snail predation** that occurs in high salinity environments.
- From 2007 to 2017, coastal water **turbidity increased** on the eastern shore and southern half of the Mobile Bay and **decreased** in the north delta and the center of the Mobile Bay.
- **Coastal SST increased** in the northern Mobile Bay and the western Mississippi Sound with some **SST decreases** observed in the southern Mobile Bay and the central Mississippi Sound.
- The project produced geospatial data products that are considered useful by end-user organizations for **aiding manatee wildlife management** and oyster **restoration** in the study area.

Mobile County Health Department &  
NASA Marshall Space Flight Center – Summer 2017

This material is based upon work supported by NASA through contract NNL16AA05C and cooperative agreement NNX14AB00A. Any mention of a commercial product, service, or activity in this material does not constitute NASA endorsement. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Aeronautics and Space Administration and partner organizations.

Coastal Alabama Oceans

